FL_Optics.zip directory structure

Each **directory** is for a specific sampling year and month, where directories are named **FEYYMM**, where FE=Florida Estuary project, YY=two-digit year 09-11, and MM=two digit calendar month 1-12.

Within each FEYYMM directory is a **sub-directory for 'HyperPRO'** data with file naming structure SS##CC_L4.dat, where SS=two letter station name representing estuaries (CH=Choctawhatchee, PB=Pensacola Bay, SA=St. Andrews Bay, and SJ=St Joe Bay); ##=two-digit station number associated with specific latitude and longitude coordinates specified below; CC=cast number incrementally recorded typically starting with AA and progressing to AB, AC, etc; L4=Satlantic Prosoft software processing to Level 4; dat=tab delimited file structure.

Directly from Satlantic Prosoft User Manual:

ProSoft processing is segmented into 4 main levels:

Level 1 - Raw binary data file from an instrument. File extension is RAW.

Level 1a - Binary data is extracted from raw data under the control of the instrument (calibration and/or telemetry definition) files. Extracted information is grouped along with its calibration information and is placed into Level 1a HDF files. File nametag is _L1a.

Level 1b - Level1b data is calibrated. If selected, CAL, BIN or NULL dark correction is applied. File nametag is _L1b.

Level 2 - Includes Level 1b data, which is further modified per request (i.e. depending on settings of processing parameters and on instrument context). File nametag is _L2. 1. Reference and dark data deglitching is applied. 2. If selected, SHUTTER dark correction is applied. 3. If a profiler instrument exists, profile editing is performed.

Level 2s – Level 2 data is interpolated onto a common co-ordinates vector, which is either depth (Profiler) or time (Reference only or SAS). File nametag is _L2s.

Level 3a – Includes averaging of Level 2s data as defined by the processing parameters. File nametag is _L3a.

Level 4 – Includes higher level data products (users choice) calculated from level 3a data. This includes products such as normalized water leaving radiances, reflectance profiles, photosynthetically available radiation etc. File nametag is _L4.

Products from Level 4 processing are best referred to from Satlantic Prosoft User Manual at http://www.seabird.com/software

Remaining files in the FFYYMM directory include:

FEYYMM_CDOM_spectra.txt - Discrete water samples were collected 0.5 m below the surface, away from boat engines, using a 200 mL Qusark bottle for the post cruise analysis of ag(λ), and typically processed within 24 hours of collection. All collection bottles were triple rinsed with surface water. The ag(λ) was determined using water filtered through Whatman 47 mm GF/F filters (nominal pore size = 0.7 μm) into combusted glass flasks. Absorption was measured using a 10 cm cuvette with a Shimadzu

UV1700 dual-beam spectrophotometer. Data were collected at 1 nm intervals between 200 and 750 nm. Milli-Q deionized water was used in the reference cell. Spectra were normalized by subtracting the measured value at 700 nm from all other wavelengths.

FEYYMMCC_PartAbs.txt - Water samples were analyzed for absorption by total particulates on Whatman 25 mm GF/F filters with a Shimadzu UV1700 dual-beam spectrophotometer at 1 nm intervals between 400-800 nm with 0.2 μm filtered seawater as the reference using the quantitative filter pad technique. Subsequently, pigments were extracted from filters with warm methanol and rescanned to measure the detritus absorption. The phytoplankton absorption coefficient was calculated as the difference between total particulate absorption and detritus absorption. Spectra were corrected for baseline noise by subtracting each wavelength from the mean measured value between 790-800 nm. First column is wavelength with each incremental column a specific station location.

FEYYMMCC_PartAbs_ad_spectra.txt - Water samples were analyzed for absorption by total particulates on Whatman 25 mm GF/F filters with a Shimadzu UV1700 dual-beam spectrophotometer at 1 nm intervals between 400-800 nm with 0.2 μm filtered seawater as the reference using the quantitative filter pad technique. Subsequently, pigments were extracted from filters with warm methanol and rescanned to measure the detritus absorption. The phytoplankton absorption coefficient was calculated as the difference between total particulate absorption and detritus absorption. Spectra were corrected for baseline noise by subtracting each wavelength from the mean measured value between 790-800 nm. First column is wavelength with each incremental column a specific station location. This file is the absorption due to detritus.

FEYYMMCC_PartAbs_ap_spectra.txt - Water samples were analyzed for absorption by total particulates on Whatman 25 mm GF/F filters with a Shimadzu UV1700 dual-beam spectrophotometer at 1 nm intervals between 400-800 nm with 0.2 μm filtered seawater as the reference using the quantitative filter pad technique. Subsequently, pigments were extracted from filters with warm methanol and rescanned to measure the detritus absorption. The phytoplankton absorption coefficient was calculated as the difference between total particulate absorption and detritus absorption. Spectra were corrected for baseline noise by subtracting each wavelength from the mean measured value between 790-800 nm. First column is wavelength with each incremental column a specific station location. This file is the absorption due to total particulates.

FEYYMMCC_PartAbs_aphi_spectra.txt - Water samples were analyzed for absorption by total particulates on Whatman 25 mm GF/F filters with a Shimadzu UV1700 dual-beam spectrophotometer at 1 nm intervals between 400-800 nm with 0.2 μm filtered seawater as the reference using the quantitative filter pad technique. Subsequently, pigments were extracted from filters with warm methanol and rescanned to measure the detritus absorption. The phytoplankton absorption coefficient was calculated as the difference between total particulate absorption and detritus absorption. Spectra were corrected for baseline noise by subtracting each wavelength from the mean measured value between 790-800 nm. First column is wavelength with each incremental column a specific station location. This file is the absorption due to phytoplankton.

FEYYMMCC_PartAbs_output.csv - Water samples were analyzed for absorption by total particulates on Whatman 25 mm GF/F filters with a Shimadzu UV1700 dual-beam spectrophotometer at 1 nm intervals between 400-800 nm with 0.2 μm filtered seawater as the reference using the quantitative filter pad technique. Subsequently, pigments were extracted from filters with warm methanol and rescanned to measure the detritus absorption. The phytoplankton absorption coefficient was calculated as the difference between total particulate absorption and detritus absorption. Spectra were corrected for baseline noise by subtracting each wavelength from the mean measured value between 790-800 nm. First column is wavelength with each incremental column a specific station location. This file is the absorption due to detritus. This file summarizes the a, ap, aphi, and ad absorption fractions by wavelength associated with the MODIS Aqua sensor.

FEYYMM_HyperSAS_organized.txt - In-situ Rrs was derived using a hyperspectral surface acquisition system (HyperSAS, Satlantic Inc., Halifax, Nova Scotia). The HyperSAS logged spectral measurements of above-water radiance (Lt(λ)), sky radiance (Li(λ)), and downwelling sky irradiance (Es(λ)) from 350–800 nm (interpolated at 1 nm intervals). HyperSAS radiance sensors were mounted on the port side of the pilot house roof of a 25 ft boat to provide 40o nadir and zenith viewing angles (Mobley 1999). During data acquisition, the boat was positioned with the radiance sensors perpendicular to the sun's azimuth to avoid boat shadow and wake. The irradiance sensor was mounted above the deck canopy with an unobstructed view of the sky. During the same time as the HyperSAS acquisition, an AC-s (WET-Labs, Philmoth, OR) quantified in-situ vertical profiles of absorption (a) and beam attenuation (c) from 400-735 nm interpolated to every 1 nm. Temperature and salinity corrections were applied to the AC-s data using corresponding Seabird CTD data (Sullivan et al. 2006). The AC-s a, c, and derived b values were averaged over the surface of the water column to secchi depth. The HyperSAS above water Rrs spectra were corrected, following the surface correction algorithm of Gould et al. (2001), using the average absorption at 412 nm and derived spectral scattering shape (Gould, Arnone, and Martinolich 1999).

Gould, R. W., R. A. Arnone, and P. Martinolich. 1999. "Spectral dependence of the scattering coefficient in case 1 and case 2 waters. ." Applied Optics 38 (12):2377-83.

Gould, R. W., R. A. Arnone, and M. Sydor. 2001. "Absorption, scattering, and remote-sensing reflectance relationships in coastal waters: testing a new inversion algorithm." Journal of Coastal Research 17 (2):326-41.

FL_Estuaries_updated.mbd – Access database of measured parameters.

Parameter	Method	Database Table
Colored Dissolved Organic Matter CDOM	Spectrophotometric	CDOM
Total Particulate Absorption	Spectrophotometric, Particulate Absorption	Part Abs
Phytoplankton Absorption	Spectrophotometric, Particulate Absorption	Part Abs
Non-phytoplankton Absorption	Spectrophotometric, Particulate Absorption	Part Abs
Total Suspended Solids	Drying oven	TSS
Chlorophyll	Fluorometric	Chl
Water Temperature	YSI 6600EDS-Surface Mapper	SMapper
Conductivity	YSI 6600EDS-Surface Mapper	SMapper
Dissolved Oxygen	YSI 6600EDS- Optical Oxygen Sensor-Surface Mapper	SMapper
Depth	YSI 6600EDS-Surface Mapper	SMapper
pH	YSI 6600EDS-Surface Mapper	SMapper
Salinity	YSI 6600EDS-Surface Mapper	SMapper
Temperature	YSI 6600EDS-Surface Mapper	SMapper
Temperature	SBE 3-CTD	CTD/YSI
Conductivity	SBE4-CTD	CTD/YSI
Dissolved oxygen	SBE43-CTD	CTD/YSI
Fluorometer	WET Labs- FLNTU-CTD	CTD/YSI
Turbidity Sensor	WET Labs- FLNTU-CTD	CTD/YSI

Absorption	Wetlabs AC-s-IOP	ACS_A_1 and ACS_C_2
Beam attenuation	Wetlabs AC-s-IOP	ACS_C_1 and ACS_C_2
DOC/DIC	Combustion, TCD detector	DOC
Stations	Lat, Long, Date, Time, Depth, Comments	Events
Samples	Cruise, station, Depth	Niskins

Stop station locations for water collection in 4 northeast Gulf of Mexico estuaries Pensacola Bay, Choctawhatchee Bay, St. Andrew Bay, and St. Joseph's Bay, FL during regular surveys.

STATION	LATITUDE	LONGITUDE
CH01	30.4085	-86.5221
CH02	30.4220	-86.5310
CH03	30.4390	-86.4740
CH04	30.4310	-86.4292
CH05	30.4237	-86.3890
CH06	30.4413	-86.3596
CH07	30.4511	-86.2977
CH08	30.4520	-86.2330
CH09	30.4180	-86.1860
CH11	30.4282	-86.5147
CH12	30.4346	-86.4954
CH13	30.4359	-86.4528
CH14	30.4256	-86.4076
CH15	30.4346	-86.3708
CH16	30.4463	-86.3437
CH17	30.4495	-86.3160
CH18	30.4540	-86.2740
CH19	30.4540	-86.2514
CH20	30.4443	-86.2159
CH21	30.4288	-86.2011
PB02	30.5404	-87.1607
PB03	30.5159	-87.1426
PB04	30.4937	-87.1305
PB05	30.4568	-87.1321
PB06	30.4151	-87.1490
PB07	30.3844	-87.2098

PB08	30.3425	-87.2464
PB09	30.3300	-87.3058
PB11	30.5221	-87.0288
PB12	30.4802	-87.0331
PB13	30.4492	-86.9767
PB14	30.4282	-87.0174
PB15	30.4175	-87.0903
PB16	30.4994	-87.0328
PB17	30.4660	-87.0070
PB18	30.4366	-86.9966
PB19	30.4240	-87.0446
PB20	30.4164	-87.1178
PB21	30.4362	-87.1380
PB22	30.4747	-87.1300
PB23	30.5059	-87.1353
PB24	30.4010	-87.1690
PB25	30.3670	-87.2290
PB26	30.3337	-87.2127
PB27	30.3402	-87.1711
SA02	30.2590	-85.8270
SA03	30.2520	-85.7540
SA04	30.2490	-85.6910
SA05	30.2025	-85.7326
SA06	30.1550	-85.7060
SA07	30.1180	-85.7340
SA08	30.1481	-85.6747
SA09	30.1091	-85.5830
SA10	30.0990	-85.5400

SA11	30.0660	-85.5050
SA15	30.2630	-85.8042
SA16	30.2598	-85.7784
SA17	30.2391	-85.7409
SA18	30.2191	-85.7345
SA19	30.2191	-85.7184
SA20	30.2359	-85.7029
SA21	30.1068	-85.5654
SA22	30.0823	-85.5177
SJ01	29.8662	-85.3856
SJ02	29.8307	-85.3856
SJ03	29.7999	-85.3880
SJ04	29.7678	-85.3761
SJ05	29.7425	-85.3707
SJ06	29.7480	-85.3341
SJ07	29.7817	-85.3348
SJ08	29.8139	-85.3314
SJ09	29.8338	-85.3484
SJ10	29.8652	-85.3583
SJ11	29.8493	-85.3712
SJ12	29.8158	-85.3647
SJ13	29.7906	-85.3595
SJ14	29.7577	-85.3531